



## **WATER RESOURCES RESEARCH GRANT PROPOSAL**

**Project ID:** 2005WA116B

**Title:** Removal of the Human Pathogen *Giardia intestinales* from Ground Water

**Project Type:** Research

**Focus Categories:** Water Quality, Toxic Substances, Water Use

**Keywords:** *Giardia*, pathogen, reactive barrier, drinking water

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**Federal Funds:** \$27,500

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**Congressional District:** Washington 5

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**Abstract**

Gastrointestinal infection due to biological contamination of water supplies is a major health issue worldwide. Simple, inexpensive methods to treat contaminated water for areas not served or underserved by utilities are needed. Here we propose to investigate the removal of the important human pathogen *Giardia intestinales* (former *G. lamblia*) from water using a reactive barrier as a biological filter.

The biological filter is a mined granular zeolite treated with a common surfactant found in hair conditioners and mouthwash. This inexpensive (\$0.50/lb) surfactant-modified zeolite (SMZ) has hydrophobic properties along with a positive surface charge that should bind neutral- to negatively charged organisms such as *G. intestinales*. Three different SMZ formulations will be prepared and their surface properties characterized. Using a laboratory model aquifer, each of these formulations will be tested for adsorption

of *G. intestinales*, and synthetic microspheres having size and charge characteristics similar to the pathogen. The most effective SMZ formulation will be further evaluated at an aquifer test facility at the University of Idaho in Moscow. The field testing will include a SMZ cartridge for point-of-use treatment. If successful, the field results will serve as models for the design of SMZ-based treatment systems. This project will provide the data sets needed to help design low-cost treatment technologies suitable for small municipal water systems. There are hundreds of such systems in the State of Washington, on the Columbia Plateau, in the Puget Lowlands, and in the foothills of the Cascades and the western Rocky Mountains.

The research is a cooperative effort among Principal Investigators Dirk Schulze-Makuch, Kent Keller, and Joan Wu of Washington State University, and Collaborator Dr. Robert Bowman of the New Mexico Institute of Mining and Technology.